APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/841,079	04/25/2001	Gene D. Tener	017750-575	5957

7590   12/29/2004

Patrick C. Keane
BURNS, DOANE, SWECKER & MATHIS, L.L.P.
P.O. Box 1404
Alexandria, VA 22313-1404

EXAMINER
EDWARDS, PATRICK L

ART UNIT	PAPER NUMBER
2621	

DATE MAILED: 12/29/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<table>
<tr>
<td rowspan="2">Office Action Summary</td>
<td>Application No.</td>
<td>Applicant(s)</td>
</tr>
<tr>
<td>09/841,079</td>
<td>TENER ET AL.</td>
</tr>
<tr>
<td></td>
<td>Examiner</td>
<td>Art Unit</td>
</tr>
<tr>
<td></td>
<td>Patrick L Edwards</td>
<td>2621</td>
</tr>
</table>

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>22 July 2004</u>.

2a)☒ This action is **FINAL**.   2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-22</u> is/are pending in the application.

　　4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) <u>1-22</u> is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

　　Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

　　Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

　　a)☐ All　b)☐ Some *　c)☐ None of:

　　　1.☐ Certified copies of the priority documents have been received.

　　　2.☐ Certified copies of the priority documents have been received in Application No. _____.

　　　3.☐ Copies of the certified copies of the priority documents have been received in this National Stage
　　　　application from the International Bureau (PCT Rule 17.2(a)).

　　* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>07-22-2004</u>.

4)☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: _____.

DETAILED ACTION

1.   The response received on July 22, 2004 has been placed in the file and was considered by the examiner. An action on the merits follows.

Response to Arguments

2.   The applicant's arguments, filed on July 22, 2004, have been fully considered. A response to these arguments is provided below.

35 USC 112, Second Paragraph Rejections

Summary of Argument: Claims 9 and 18 were rejected in the prior action under 35 USC § 112(2). Applicant has amended these claims to overcome the rejection.

Examiner's Response: The previous rejection is hereby withdrawn.

Prior Art Rejections

Summary of Argument: Applicant has amended independent claims 1 and 10 by adding the limitation of selecting another frame as an updated template frame. Applicant argues that the Bender reference does not disclose this limitation (see applicant's remarks pg. 15). More specifically, applicant argues that Bender is "concerned with generating a still image, not with processing frames of input image data to produce successive frame of high quality video output data."

Examiner's Response: With regard to applicant's argument that Bender does not process frames of input image data "to produce successive frames of high quality video output data", this limitation is not recited in the claims and is therefore irrelevant. Applicant is respectfully reminded that limitations from the disclosure are not read into the claims. For a refresher on this point, applicant is respectfully invited to consult MPEP § 2111.

Furthermore, Bender discloses the additional limitation of selecting an updated template frame. Figure 14 of the Bender disclosure provides a nice illustration of this point. Frame 702 is initially captured and is used as a template frame used to align frame 704 (the next frame). Frame 706 is captured after frame 704. Frame 706 is not aligned with the initial template frame 702, but is aligned with frame 704. Frame 704 is therefore the template frame. This shows that frame 704 was selected as the updated template frame. As can be seen from Figure 14, these template frames will be updated until the last image is captured. Therefore, the newly amended independent claims are still met by the Bender reference. Applicant's arguments are not persuasive.

Claim Rejections - 35 USC § 102

3.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4.   Claims 1, 2, 3, 10-12, and 19-22 are rejected under 35 U.S.C. 102(b) as being anticipated by Bender et al. (USPN 5,657,402).

With regard to claim 10, which is representative of claim 1, Bender discloses a sensor for generating input data and a processor module coupled to the sensor (col. 3 lines 14-17).

Bender further discloses selecting a first frame of data as a template frame and capturing a second frame of data using the EO system (col. 12 lines 13-17 in conjunction with Fig. 6).   Bender discloses registering frame 201 with frame 202. In this particular situation, frames 201 and 202 from Bender are analogous to the claimed second frame and template frame, respectively. Bender further discloses capturing these frames with a video camera (col. 24 lines 46-48). This qualifies as an EO system as recited in the claim (see paragraph [0005] of the applicant's disclosure).

Bender further discloses correlating at least a portion of the second frame with the template frame to generate a shift vector (col. 11 line 66 – col. 12 line 7). Bender discloses a process for determining partial derivatives Ix, Iy and It. These partial derivate terms, which are used in the subsequent interpolation operation, qualify as the shift vectors recited in the claim in that they correspond to a difference between the frames (aka shift) and they are vectors by definition. It follows that the determination of the shift vector as disclosed in Bender is analogous to the claimed process of correlating the frames.

Bender further discloses registering the second frame with the template frame by interpolating the second frame using the shift vector (col. 11 line 19 – col. 12 line 47) and resampling at least a portion of the second frame to produce a registered frame (col. 12 line 63 – col. 13 line 6). In the first cited passage, Bender details the affine transformation (col. 11 lines 23-26) which uses the aforesaid shift vector (col. 11 line 65 – col. 12 line 1). Interpolation is an inherent aspect of an affine transformation. So, although Bender fails to explicitly recite that an interpolation process is being performed on the frame, this is inherently disclosed in the reference. A reference has been provided (TransformJ: Affine) which further clarifies that interpolation is indeed inherent in an affine transformation.   In the second cited passage, Bender discloses a resampling operation of the frame which is being warped.

Bender further discloses resampling the template frame (col. 14 lines 30 - 50). In the cited passage Bender discloses a situation where a frame 251 is being warped (registered) with a frame 252. In this case, frame 252 is analogous to the claimed template frame and after the warping is done, frame 251 is registered with the template frame. It follows that the template frame 252 is warped with the scale of frame 253. Consequently, Bender discloses resampling the template frame.

Bender further discloses combining the resampled template frame and the registered frame to generate an averaged frame (col. 17 lines 24-27 with element 414 of Figure 12). The temporal median filter disclosed in Bender generates an averaged frame of the resampled template frame and the registered frame.

Bender further discloses selecting another frame as an updated template frame to which a subsequently captured frame of data is registered (Bender, Figure 14 in conjunction with col. 19 lines 47-62 and the above argument provided in the 'response to arguments section', which will not be repeated herein).

With regard to claims 19 and 20, Bender discloses a predetermined number of intervals as 1. This is seen in Figure 14, where each new frame serves as a template frame for the subsequently-captured frame.

With regard to added claims 21 and 22, these claims merely repeat the limitations of claims 1 and 10. Claim 22 adds the limitation of a sensor and a processor. These features are inherent in the Bender disclosure.

With regard to claim 11, which is representative of claim 2, Bender further discloses using bilinear interpolation in the step of registering a second frame with a template frame (col. 13 lines 4-6). The bilinear interpolation disclosed in Bender occurs in the process of resampling a portion of the second frame. This process is part of the step of registering the second frame.

With regard to claim 12, which is representative of claim 3, Bender discloses adding motion to a line of sight of the EO system using a commanded line of sight pattern or a random pattern to generate multiple frames of data (col. 23 lines 1-7 and lines 55-65). The alteration of the field of view among the images in a sequence as disclosed in Bender is analogous to adding motion to a line of sight as recited in the claim. Bender does not disclose whether the field of view of the images in a sequence is altered according to a pattern or whether it is altered randomly. However, it is inherent that Bender's alteration of the field of view has to be performed either randomly or according to a pattern, seeing that no other options exist. Consequently, Bender teaches all of the limitations of the claim.

Claim Rejections - 35 USC § 103

5.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6.   Claims 6, 7, 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bender as applied to claims 1 and 10 above, and further in view of Hanna et al. (USPN 6,269,175). The arguments as to the relevance of Bender as applied in paragraph 2 above are incorporated herein.

With regard to claim 15, which is representative of claim 6, Bender fails to expressly disclose resampling the averaged frame. Hanna, however, discloses a "compositing process" which is analogous to the averaged frame generating process (or combining process) recited in the claim, and further discloses resampling the averaged frame

data after the compositing process (Hanna col. 12 lines 13-49). The filling of unfilled pixels disclosed in Bender qualifies as the claimed image resampling. It would have been obvious to one reasonably skilled in the art at the time of the invention to modify Bender's image processing apparatus by resampling the previously averaged frame data as taught by Hanna. Such a modification would have allowed for a synthesized output image with a higher resolution.

With regard to claim 16, which is representative of claim 7, Hanna discloses using an upsampled frame for the purpose of filling in previously unfilled pixels (Hanna col. 12 lines 46-49). Hanna further discloses that the upsampled frame was interpolated using a bilinear interpolation method (Hanna col. 11 lines 55-57).

7.   Claims 4 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bender as applied to claims 1 and 10 above, and further in view of Komiya et al. (USPN 6,205,259). The arguments as to the relevance of Bender as applied in paragraph 2 above are incorporated herein.

With regard to claim 13, which is representative of claim 4, Bender discloses determining an averaged frame, but fails to expressly disclose spatially filtering the averaged frame in order to enhance the edges. Komiya, however, discloses an image synthesizing circuit (which determines an averaged frame as recited in the claim) which is connected to the input of an edge emphasizing circuit (Komiya col. 24 lines 41-50 with Figure 41). It would have been obvious to one reasonably skilled in the art at the time of the invention to modify Bender's image processing apparatus by adding an edge enhancer for the averaged frame data as taught by Komiya. Such a modification would have allowed for an output image which contained uniformly enhanced edges.

8.   Claims 8, 9, 17 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bender as applied to claims 1 and 10 above, and further in view of Van Ackere et al. (USPN 6,047,028). The arguments as to the relevance of Bender as applied in paragraph 2 above are incorporated herein.

With regard to claim 17, which is representative of claim 8, Bender fails to expressly disclose temporally filtering a first frame to generate the template frame. Van Ackere, however discloses temporally filtering a first frame in order to generate the template frame (Van Ackere abstract). It would have been obvious to one reasonably skilled in the art at the time of the invention to modify Bender's image processing apparatus by temporally filtering an input to generate the template frame as taught by Van Ackere. Such a modification would have allowd for a template (reference) image with less noise (Van Ackere abstract).

With regard to claim 18, which is representative of claim 9, Bender further discloses a resampling operation which utilizes bilinear interpolation (Bender col. 13 lines 1-6).

9.   Claims 5 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bender as applied to claims 1 and 10 above, and further in view of Chen (USPN 6,556,704). The arguments as to the relevance of Bender as applied in paragraph 2 above are incorporated herein.

With regard to claim 14, which is representative of claim 5, Bender discloses determining an average frame, but fails to expressly disclose utilizing a histogram to change its pixel depth. Chen, however, discloses changing pixel depth on the basis of a histogram (Chen col. 4 lines 1-13). It would have been obvious to one reasonably skilled in the art at the time of the invention to modify Bender's image processing system by including a method for utilizing a histogram in order to change pixel depth. Such a modification would have allowed for an output image that had more clearly imaged background and foreground regions and consequently was more pleasant to look at (Chen col. 4 lines 1-13).

Conclusion

10.   **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

11.   The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

   o   Schmucker et al. (USPN 6,185,315) discloses inputting and aligning multiple image frames and updating the 'template frame' in the process.
   o   Saund (5,528,290) discloses a method for aligning overlapping image tiles with one another.

12.   Any inquiry concerning this communication or earlier communications from the examiner should be directed to Patrick L Edwards whose telephone number is (703) 305-6301. The examiner can normally be reached on 8:30am - 5:00pm M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Leo Boudreau can be reached on (703) 305-4706. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Patrick L Edwards   Art Unit 2621

ple

LEO BOUDREAU
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600